AMENDMENT

IN THE CLAIMS

Kindly cancel currently pending claims and substitute therefore new claims 37 through 62. Multiple dependent claims have been canceled to reduce costs, and not with respect to any issue of patentability.

RESPONSE

This is responsive to the latest official action on the merits in this case, made final and mailed dated October 24, 2001. The applicant respectfully requests reconsideration and further examination of his application, in view of the foregoing amendments and in view of the comments and clarifications contained herein.

1. As noted by the applicant in an earlier reply, the starting point for evaluation of the invention is the statutory mandate that "whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor" subject to the other requirements of the patent statutes. 35 U.S.C. Section 101. This section has been clearly interpreted as meant to include "anything under the sun that is made by man." Diamond v. Chakrabarty, 447, U.S. 303, 309, 65 L.Ed.2d 144, 100 S.Ct

2204 (1980) (quoting S. Rep. No. 1979, 82d Cong., 2d Sess., 5 (1982); H.R. Rep. No. 1923, 82d Cong., 2d Sess., 6 (1952).

As explained earlier, in this situation, the inventor is faced with a rather common but difficult problem, namely, how can the product of his process be adequately described? As noted in footnote 4 of Atlantic Thermoplastics Co. et al v. Faytex, 974 F.2d 1299, 24 USPQ2d 1138 (CAFC 1992), some processes "like a chemical purification process - might yield a different product each time performed. Each time performed, the process might yield a product with differences in chemical structure, differences in concentrations of components, differences in purity, in sum, different products." That unique end product produced by the inventive process described herein is worthy of patent protection. None of the prior art processes cited by the examiner produce, an equivalent product at equivalent economics.

Given the infinite variety and complexity of available feedwaters from which to produce a treated water composition having trace amounts of solutes remaining therein, to describe such a product by an analytical analysis of the final composition, for a variety of starting feedwaters, would be a Herculean and virtually impossible task. On the other hand, the inventor and the undersigned patent practitioner face the claims construction problem created by the Federal Circuit's decision in Exxon Chemical

Patents, Inc., et al v. Lubrizol Corporation, 77 F.3d 450, 1996 U.S. App. Lexis 3150, 37 U.S.P.Q.2d (BNA) 1767, (CAFC 1996), where merely describing in a claim the ingredients in a composition, which ingredients later react in that composition, was deemed insufficient to validly protect the product as claimed. Thus, as the heart of the novel and unobvious product water composition results from treatment by a novel and unobvious process, as suggested in the above referenced Exxon Chemical Patents v. Lubrizol matter, the inventor has set forth his invention in terms of product-by-process claims.

Unfortunately, in this case, the examiner has taken the position that the claims as previously presented is obvious over five separate references, although it appears that the two Collentro references have been combined by the examiner. However, none of the asserted references teach producing an economical and unique water product by reducing the tendency of the feedwater to scale in membrane separation equipment by effecting two or more of (i) hardness removal, (ii) the removal of substantially all non-hydroxide alkalinity, or (iii) removing dissolved gas, before the concentration of a feedwater to a selected concentration. Moreover, the just mentioned limitations, are not inherent in any of the cited references, nor were they known in the art prior to the issue of the parent case hereto (or, by way of publication of the related International Application under the Patent

Cooperation Treaty, or papers presented to industry by the inventor herein).

2. Rejection under 35 U.S.C. Section 103 (a) Based on Collentro, et al (U.S. Patents 5,766,479 and 5,670,053)

First, the examiner has again rejected previously pending claims 11-15, 25-27, 29 and 33 (corresponding to current claims 37-41, 51-53, 55, and 59) as being obvious under 35 U.S.C. Section 103(a) over the Collentro et al. US Patents '479 and '053 as referenced above.

It is respectfully believed that this is incorrect. As was pointed out in great detail in the parent case to this application, neither of Collentro's patents cited by the examiner removes substantially all alkalinity from the feedwater (as set forth in claim 37, or substantially all of the non-hydroxide alkalinity from the feedwater (as set forth in claim 38), before treatment of the feedwater in membrane separation equipment. Therefore it is respectfully requested that any rejections under 35 U.S.C. Section 103(a), based on either of the cited Collentro patents, be removed.

3. Rejection under 35 U.S.C. Section 103 (a) Based on Bhave, et al (U.S. Patent 5,645,727)

Next, the examiner has rejected prior pending claims 11-36 as being obvious over Bhave, et al '727. Bhave is directed

to particle filtration from ultrapure water. Although Bhave discloses the production of ultra pure water in which the content of virus, bacteria, and TOC, is minimized by on-line ozonation, he does not disclose a water composition in which scale forming components have been removed prior to treatment via reverse osmosis processing under high pH conditions. Bhave does not produce a high pH pure water stream with removal efficiencies as claimed in the various dependent claims set forth herein.

It is impossible to show, from Bhave itself, that Bhave's process achieves the claimed removal efficiency. No teaching or suggestion of Bhave; moreover, it does not make obvious the claimed invention. Thus, it is respectfully requested that this basis of rejection be withdrawn.

4. Rejection under 35 U.S.C. Section 103 (a) Based on Abe, et al (U.S. Patent 5,573,662)

The examiner has rejected prior pending claims 11-15 as being obvious by Abe, et al, U.S. Patent 5,573,662. As applied to the presently presented claims including limitations with respect to TOC removal during the treatment process, the applicant respectfully disagrees. Although Abe discloses the efficient removal of TOC in an ultrapure water treatment process, Abe does not exactly disclose the now claimed composition. Therefore it is respectfully requested

that any rejection under 35 U.S.C. Section 103(a) based on the cited Abe reference be removed.

5. Rejection under 35 U.S.C. Section 103 (a) Based on Bhave, et al (U.S. Patent 5,645,727)

Finally, the examiner has rejected prior pending claim 16 (directed to the degree of boron removal) as being obvious over Tao, et al, U.S. Patent 5,250,185. The applicant respectfully disagrees. Although Tao discloses the efficient removal of boron via reverse osmosis during high pH operation, he does not do so in combination with high rejection of Total Organic Carbon.

In any event, all claims directed to removal of boron are dependent upon a novel and unobvious parent claims, and thus are clearly even less obvious. Therefore it is respectfully requested that any rejection under 35 U.S.C. Section 103(a) based on the cited Tao reference be removed.

SUMMARY

The applicant has invented a novel, economically important treated water composition, a PRODUCT, which in individual cases can be uniquely identified by reference to the feedwater from which the water composition is produced. It is believed that the newly presented claims define over the prior art of record. It is therefore respectfully

argued that none of the cited art references makes the applicant's invention obvious as claimed. Therefore, reconsideration and withdrawal of the rejections based on 35 U.S.C. Section 103(a) is respectfully requested.

For the reasons discussed in detail above, it is believed that this application is now limited to claims which are clearly patentable over references of record. Favorable consideration of this application is therefore believed to be in order and such action is earnestly solicited.

Finally, if any outstanding issues remain after review of this response, the applicant and the undersigned respectfully request that an interview at the Patent Office be scheduled to review the matter.

Respectfully submitted,

DEBASISH MUKHOPADHYAY

by: R. Reams Goodloe, Jr.
SIGNATURE OF ATTORNEY

Date: April 24, 2002

Phone: 253-859-9128
Fax: 253-859-8915

R. Reams Goodloe, Jr.
Reg. No. 32,466

Suite 3
10725 S.E. 256th Street
Kent, Washington
98031-6426

37. A composition of water and dissolved solutes, said composition produced by a process of treatment of a feedwater stream in membrane separation equipment, wherein said membrane separation equipment comprises at least one unit having a membrane separator, and wherein said process of treatment produces a low solute containing product water stream and a high solute containing reject stream, wherein said process comprises:

(a) providing a feedwater stream containing solutes therein, said solutes comprising

(i) hardness,

(ii) alkalinity, and

(iii) at least one molecular species which is sparingly ionized when in neutral or near neutral pH aqueous solution;

(b) concentrating said feedwater stream in a first unit of said membrane separation equipment after reducing the tendency of said feedwater to form scale when said feedwater is concentrated to a preselected concentration factor at a selected pH, by effecting, in any order, two or more of the following:

(i) removing hardness from said feedwater stream;

(ii) removing substantially all alkalinity associated with hardness from said feedwater stream;

(iii) removing dissolved gas from said feedwater stream, whether initially present or created during said hardness or said alkalinity removal step;

(c) raising the pH of the product from step (a) to a selected pH of at least about 8.5, to urge said at least one molecular species which is sparingly ionized when in neutral or near neutral pH aqueous solution toward increased ionization;

(d) passing the product from step (c) above through said membrane separation equipment, said membrane separation equipment substantially resisting passage of dissolved species therethrough, said membrane rejecting said at least one molecular species which is sparingly ionized when in neutral or near neutral pH aqueous solution by at least 95% while concentrating said feedwater to said preselected concentration factor, to produce

(i) a high solute containing reject stream, and

(ii) a low solute containing water product stream.

38. A composition of water and dissolved solutes, said composition produced by a process of treatment of a feedwater stream in membrane separation equipment, wherein said membrane separation equipment comprises at least one unit having a membrane separator, and wherein said process of treatment produces a low solute containing product water stream and a high solute containing reject stream, wherein said process comprises:

(a) providing a feedwater stream containing solutes therein, said solutes comprising

(i) hardness,

(ii) alkalinity, and

(iii) at least one molecular species which is sparingly ionized when in neutral or near neutral pH aqueous solution;

(b) concentrating said feedwater stream in a first unit of said membrane separation equipment after reducing the tendency of said feedwater to form scale when said feedwater is concentrated to a preselected concentration factor at a selected pH, by effecting, in any order, two or more of the following:

(i) removing hardness from said feedwater stream;

(ii) removing substantially all non-hydroxide alkalinity associated with hardness from said feedwater stream;

(iii) removing dissolved gas from said feedwater stream, whether initially present or created during said hardness or said alkalinity removal step;

(c) raising the pH of the product from step (a) to a selected pH of at least about 8.5, to urge said at least one molecular species which is sparingly ionized when in neutral or near neutral pH aqueous solution toward increased ionization;

(d) passing the product from step (c) above through said membrane separation equipment, said membrane separation equipment substantially resisting passage of dissolved species therethrough, to concentrate said feedwater to said preselected concentration factor, to produce

(i) a high solute containing reject stream, and

(ii) a low solute containing product water stream.

39. A composition of water and dissolved solutes, said composition produced according to the process of claim 37, wherein said feedwater stream comprises at least some Total Organic Carbon, and wherein said product water stream comprises at least some Total Organic Carbon, and wherein said Total Organic Carbon in said product water product stream is less than one percent of the Total Organic Carbon in said feedwater stream.

40. A composition of water and dissolved solutes, said composition produced according to the process of claim 39, wherein the Total Organic Carbon in said product water stream is less than 0.4% of the Total Organic Carbon in said feedwater stream.

41. A composition of water and dissolved solutes, said composition produced according to the process of claim 39, wherein the Total Organic Carbon in said product water stream is less than 0.34% of the Total Organic Carbon in said feedwater stream.

42. A composition of water and dissolved solutes, said composition produced according to the process of claim 37, wherein

(a) said feedwater stream further comprises boron, and wherein said product water stream is characterized by having a

boron content of less than about two percent (2%) of the boron content of said feedwater stream; and

(b) said feedwater stream comprises at least some Total Organic Carbon, and wherein said product water stream comprises at least some Total Organic Carbon, and wherein said Total Organic Carbon in said product water product stream is less than one percent of the Total Organic Carbon in said feedwater stream.

43. A composition of water and dissolved solutes, said composition produced according to the process of claim 37, wherein

(a) said feedwater stream further comprises boron, and wherein said product water stream is characterized by having a boron content of about one and one-half percent (1.5%), or less, of the boron content of said feedwater stream; and

(b) said feedwater stream comprises at least some Total Organic Carbon, and wherein said product water stream comprises at least some Total Organic Carbon, and wherein said Total Organic Carbon in said product water product stream is less than one percent of the Total Organic Carbon in said feedwater stream.

44. A composition of water and dissolved solutes, said water produced according to the process of claim 37, wherein

(a) said feedwater stream further comprises boron, and wherein said product water stream is characterized by having a

boron content of about one percent (1%), or less, of the boron content of said feedwater stream; and

(b) said feedwater stream comprises at least some Total Organic Carbon, and wherein said product water stream comprises at least some Total Organic Carbon, and wherein said Total Organic Carbon in said product water product stream is less than one percent of the Total Organic Carbon in said feedwater stream.

45. A composition of water and dissolved solutes, said composition produced according to the process of claim 42, wherein said Total Organic Carbon in said product water stream is less than 0.4% of the Total Organic Carbon in said feedwater stream.

46. A composition of water and dissolved solutes, said composition produced according to the process of claim 43, wherein said Total Organic Carbon in said product water stream is less than 0.4% of the Total Organic Carbon in said feedwater stream.

47. A composition of water and dissolved solutes, said composition produced according to the process of claim 44, wherein said Total Organic Carbon in said product water stream is less than 0.4% of the Total Organic Carbon in said feedwater stream.

48. A composition of water and dissolved solutes, said composition produced according to the process of claim 42, wherein said Total Organic Carbon in said product water stream is less than 0.34% of the Total Organic Carbon in said feedwater stream.

49. A composition of water and dissolved solutes, said composition produced according to the process of claim 43, wherein said Total Organic Carbon in said product water stream is less than 0.34% of the Total Organic Carbon in said feedwater stream.

50. A composition of water and dissolved solutes, said composition produced according to the process of claim 44, wherein said Total Organic Carbon in said product water stream is less than 0.34% of the Total Organic Carbon in said feedwater stream.

51. A composition of water and dissolved solutes, said composition produced according to the process of claim 37, wherein said feedwater stream further comprises silica, and wherein said product water stream is characterized by having a silica content of less than about 0.05% of the silica content of said feedwater stream.

52. A composition of water and dissolved solutes, said composition produced according to the process of claim 42, wherein

said feedwater stream further comprises silica, and wherein said product water stream is characterized by having a silica content of less than about 0.05% of the silica content of said feedwater stream.

53. A composition of water and dissolved solutes, said composition produced according to the process of claim 43, wherein said feedwater stream further comprises silica, and wherein said product water stream is characterized by having a silica content of less than about 0.05% of the silica content of said feedwater stream.

54. A composition of water and dissolved solutes, said composition produced according to the process of claim 44, wherein said feedwater stream further comprises silica, and wherein said product water stream is characterized by having a silica content of less than about 0.05% of the silica content of said feedwater stream.

55. A composition of water and dissolved solutes, said composition produced according to the process of claim 37, wherein said feedwater stream further comprises bacteria, and wherein said product water stream is characterized by having essentially zero bacteria content.

56. A composition of water and dissolved solutes, said composition produced according to the process of claim 42, wherein said feedwater stream further comprises bacteria, and wherein said product water stream is characterized by having essentially zero bacteria content.

57. A composition of water and dissolved solutes, said composition produced according to the process of claim 43, wherein said feedwater stream further comprises bacteria, and wherein said product water stream is characterized by having essentially zero bacteria content.

58. A composition of water and dissolved solutes, said composition produced according to the process of claim 44, wherein said feedwater stream further comprises bacteria, and wherein said product water stream is characterized by having essentially zero bacteria content.

59. A composition of water and dissolved solutes, said composition produced according to the process of claim 37, wherein said feedwater stream further comprises live viruses, and wherein said product water stream is characterized by having essentially zero live viruses therein.

60. A composition of water and dissolved solutes, said composition produced according to the process of claim 42, wherein said feedwater stream further comprises live viruses, and wherein said product water stream is characterized by having essentially zero live viruses therein.

61. A composition of water and dissolved solutes, said composition produced according to the process of claim 43, wherein said feedwater stream further comprises live viruses, and wherein said product water stream is characterized by having essentially zero live viruses therein.

62. A composition of water and dissolved solutes, said composition produced according to the process of claim 44, wherein said feedwater stream further comprises live viruses, and wherein said product water stream is characterized by having essentially zero live viruses therein.